# EAST AFRICAN BRYOPHYTES, XX.
# OBSERVATIONS ON SOME CALYPOGEIACEAE

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The occurrence *Mnioloma caespitosum* (Spruce) R. M. Schust. on Mt. Kilimanjaro, hitherto known only from South America, is new to Africa. Leaf surface of *Calypogeia longifolia* Steph. collected in Madagascar and observed by SEM, is covered by wax lamellae. This is the third generic record among liverworts on the presence of cuticular surface wax.

A *Mnioloma caespitosum* (Spruce) R. M. Schust., eddig csak Dél-amerikából ismert májmoha előfordulásai a Kilimandzsárón újak egész Afrikára nézve. A Madagaszkáron gyűjtött *Calypogeia longifolia* Steph. pásztázó elektronmikroszkópon vizsgált levélfelületét viaszlemezkék borítják. Ez a harmadik májmoha nemzetség, ahol a kutikula felületén viaszbevonat figyelhető meg.

## On *Mnioloma caespitosum* (Spruce) R.M. Schust. in Africa.

The author published from the upper montane forest belt of Mt. Kilimanjaro a record of *Calypogeia fusca* (Lehm.) Steph. (in Bizot & Pócs 1974). This species, according to the revision of Bischler (1970) is widespread in tropical Africa, being the only representative on the continent of the otherwise Neotropical subgenus *Caracoma* Bischler (Bischler, 1962) and occurring also in Sri Lanka, Papua New Guinea, Solomon Islands an Hawaii (Grolle 1977), in Thailand (Kitagawa 1988) and recently found in New Zealand (Renner, 2003), having a wide Palaetropical range.

Since the generic name of *Mnioloma* Herzog (1930) was reapplied by Schuster (1995), who included two of the three subgenera distinguihed by Bischler (1962), namely *Caracoma* and *Mnioloma* within the frame of genus *Mnioloma*, leaving only subgenus *Calypogeia* in the genus *Calypogeia*. According to this concept the name of the above species became *Mnioloma fuscum* (Lehm.) R.M. Schust.

T. Pócs and B. O. van Zanten in 1986 collected again a plant on Mt. Kilimanjaro, which resembled the previously collected specimen and keyed out from Bischler's revision to *Calypogeia fusca*, but did not fit well in its descripton. The author presently reinvestigated these specimens, which

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turned out to be identical with the South American *Mnioloma caespitosum* (Spruce) R. M. Schust.

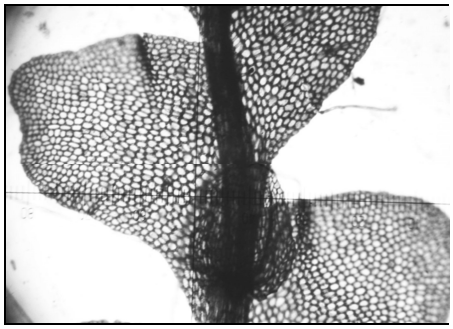
Gradstein et al. (1984) listed 35 disjunct Afro/American liverwort species, which number since considerably increased. Among the species, which are distributed on both continents and not elsewhere, they distinguish a group of tropical montane element. *Mnioloma caespitosum* is a typical representative of this group, being known from the forest belts of Bolivian, Colombian and Ecuadorian Andes and of Guyana Highland at 600–1700 m altitudes and in Brazil from the upper Rio Negro and Uapés near 600 m (Spruce 1885, Bischler 1962, Yano 1984, Gradstein & da Costa 2003) in South America.

In Africa it was found at two localities in the forest belt of the southerly slopes of Mount Kilimanjaro in Tanzania: Along Umbwe Route at 2850-2900 m altitude in the uppermost *Erica arborea* forest with scattered *Podocarpus* and *Hagenia* trees, in *Sphagnum* cushions hanging from lava rocks, coll. T. Pócs, No. 6788/CW, 23. Sept. 1972 (EGR) and along the Machame Route, near the Park Gate, at 1800 m altitude, on irrigated lava rocks near a waterfall. Coll. T. Pócs & B. O. van Zanten, No. 86135/B, 11. Aug. 1986.

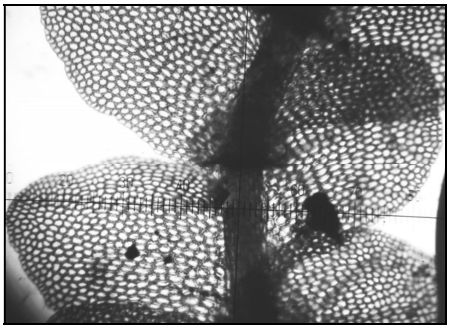
The mean differences between *Mnioloma caespitosum* and *M. fuscum* are encountered in Table I and on Plate I:

*Table 1.*

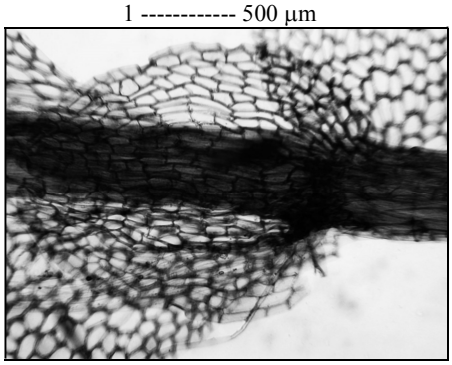
| *Mnioloma caespitosum* | *Mnioloma fuscum* |
|---|---|
| Shoots 2-5 cm long and 2-3 mm wide. | Shoots 1- 2 cm long and 1-2.5 mm wide. |
| Leaves long decurrent, tend to be triangular in outline. | Leaves short decurrent, with more or less parallel sides. |
| Leaf margin with 1-2 rows of perpendicularly elongated cells sometimes with incrassated walls (but at many parts indistinct). | Leaf margin not differentiated at all, just consisting of smaller cells, often slightly crenulate. |
| Leaf cells thin walled, translucent with smooth or finely papillose surface. | Leaf cells with more or less incrassate walls, opaque due to the densely papillose or striolate upper and lower surface. |
| Underleaves longer than wide, elongated ovate, with smooth margin except an apical notch. Translucent, with thin walled, elongated cells with smooth surface. | Underleaves broader than long or as broad as long, orbicular, often with crenulated upper margin. Cells of mixed shape (apart from elongated cells in midline), with densely papillose or striolate surface . |



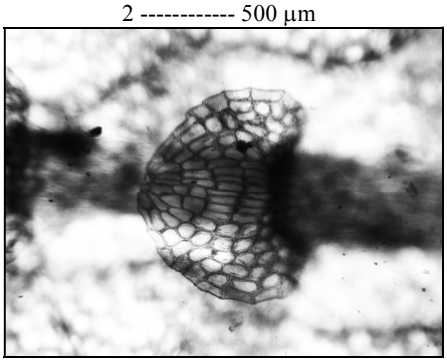
1 ---------- 500 μm



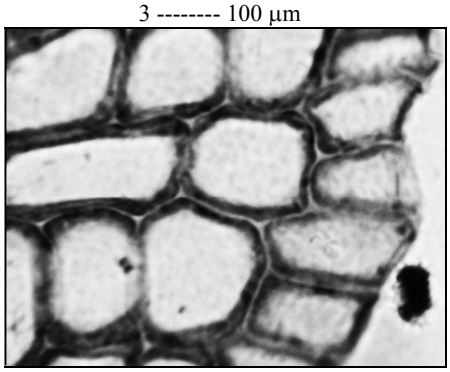
2 ---------- 500 μm



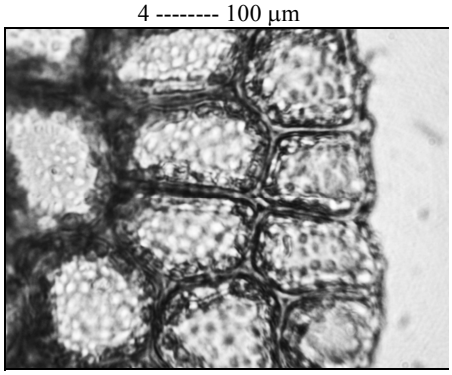
3 -------- 100 μm



4 -------- 100 μm



5 -------- 20 μm



6 -------- 20 μm

Plate I.

Fig. 1: *Mnioloma caespitosum* (Spruce) R.M. Schust. Part of shoot, ventral view.

Fig. 2: *Mnioloma fuscum* (Lehm.) Schust. Part of shoot, ventral view.

Fig. 3: *Mnioloma caespitosum*. Underleaf.

Fig. 4: *Mnioloma fuscum*. Underleaf.

Fig. 5: *Mnioloma caespitosum*. Leaf margin.

Fig. 6. *Mnioloma fuscum*. Leaf margin. Figs 1, 3 and 5 photographed from Pócs 89229/L, Mt. Kilimanjaro, Umbwe Route, 2400 m. Figs 2, 4 and 6 photographed from Pócs 6788/CW, Mt. Kilimanjaro, Umbwe Route, 2900 m.

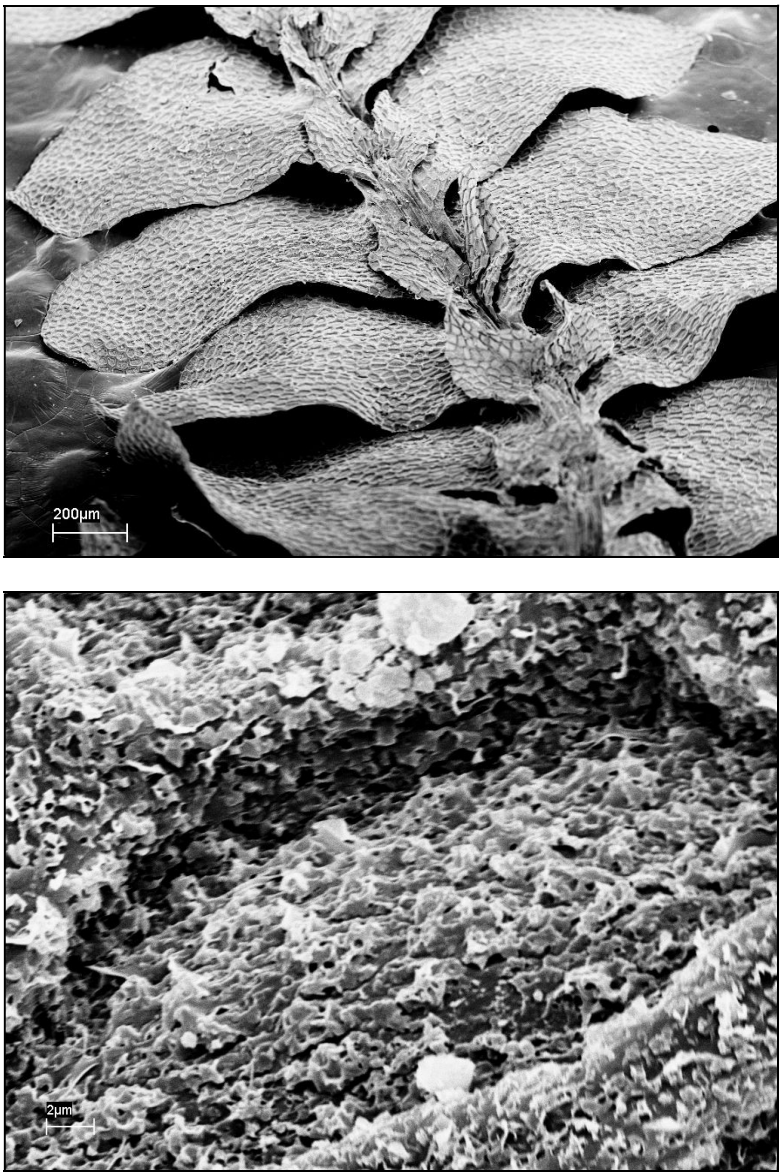



Plate II.
Upper picture: Calypogeia longifolia Steph. Habit, ventral view.
Lower picture: Calypogeia longifolia Steph. Lower surface of a leaf cell. SEM micrographs made from Orbán 9455/G, Madagascar, Isalo N.P.

The above differences give strikingly different appearence for the two species, *M. caespitosum* having large but loose, gracile, translucent habit, while *M. fuscum* is an appressed, dense foliated, opaque plant.

## On the cuticular surface of *Calypogeia longifolia* Steph.

During our 1994 expedition in Madagascar, Prof. Sándor Orbán, accompanied by András Szabó and András Vojtkó from Eger College, collected a *Calypogeia* species of striking glaucous, opaque appearence. The specimen was collected in the Isalo National Park notorious for its rich xeric, succulent vegetation. The plant was found in the interesting, isolated humid habitat of "Piscine Naturelle", 5 km W of Ranohira, on sandy soil among filmy fern rhizomes at the edge of the small spring basin, in the shade of *Pandanus pulcher* trees, Orbán No. 9455/G. The author was first thinking of a new taxon, but later identified it, as a relative widespread tropical African species, *Calypogeia longifolia* Steph. During his SEM examination carried out in electron microscopic laboratory of the Institute für Biologie, Systematische Botanik und Pflanzengeographie, Freie Universität Berlin-Dahlem it turned out that the glaucous, opaque appearence, a bit similar to that of *Mnioloma* species, is given by the dense cover of wax lamellae on the cuticular surface of leaves and underleaves (see Plate II). The essential difference is, that by *Mnioloma* the glaucous, opaque appearence is given by the dense papillosity of cell walls, not by surface wax, as in *Calypogeia longifolia*.

Heinrichs et al. (2000, 200l) attributed great taxonomic importance to the surface wax among the liverworts, as the phenomenon is very rare among all hepatics. Leaf wax cover is hitherto known only in the holarctic *Anthelia julacea* (L.) Dumort., studied by several authors and discovered recently in several species of *Plagiochila* by Heinrichs et al. (l.c.), in form of rodlets and platelets. According to Heinrichs et al. (l.c.) cuticular surface wax is a good taxonomic marker to distinguish related taxa.

As it can be seen on the lower figure of Plate II, the wax cover of our plant consists of densely and irregularly arranged wax lamellae of 1-2 μm diameter, above the cell more perpendicular to the surface but above the radial walls often laying in heaps of scales.

After studying other specimens of *Calypogeia longifolia,* for example on one from Mount Kilimanjaro, above Nkweseko village, growing on a roadcut surface at 1400 m altitude in *Protea-Agauria* woodland, (coll. T. Pócs & E.W. Jones, No. 8608/A, record new to Tanzania!), the same type of wax cover was found. Bischler (1970) mentions, that *Calypogeia longifolia* is closely related to two Neotropical species: to *Calypogeia grandistipula*

(Steph.) Steph. and to *C. puiggarii* Steph. Fulford (1968) considers the two latter, as synonymous. They both are similar in appearence to *C. longifolia* and probably have the same type of wax cover, encircling and uniting a natural group of species.

The rôle of wax cover, like on the above ground organs of the phanerogams, where it is a common phenomenon, is probably the protection against superfluous water, as the waxed surface is hidrophobous and prohibits surface moistening.

## Acknowledgements

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